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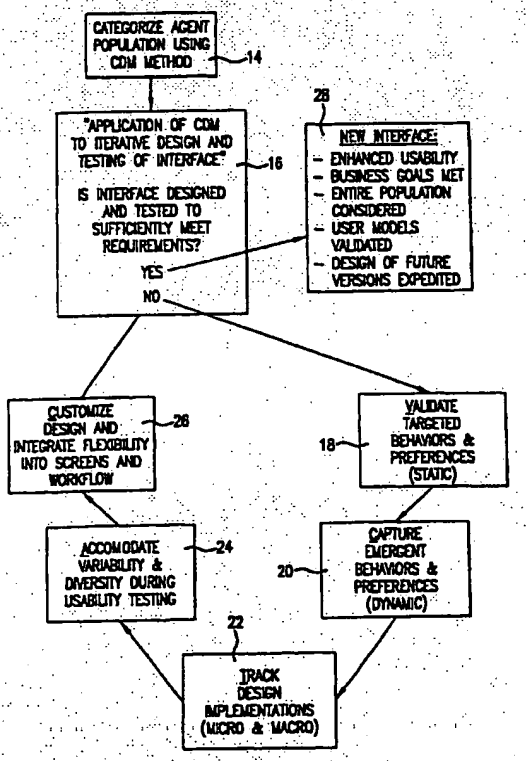

(57) Abstract: A method used in the business environment and applying human factor to manage client/customer data incorporates a detailed, precise procedure of designing a user interface by utilizing agent behavioral models. This method applies quantitative and qualitative agent behavioral models derived through the Categorize Describe Model (CDM) methodology (16) to the iterative design stage of interface development. An additional method is provided that identifies and categorizes the reason a customer contacts a customer service center. It allows the customer to be categorized into a set of behavior-based groupings (20). This integration of goal and customer categorization establishes the foundation to optimally direct the customer's request through an appropriate center, and to optimally handle the customer request.

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TITLE OF INVENTION:

METHODS FOR INTEGRATING USER MODELS TO INTERFACE DESIGN AND FOR IDENTIFYING AND CATEGORIZING CUSTOMER'S GOALS AND BEHAVIORS WITHIN A CUSTOMER SERVICE CENTER ENVIRONMENT

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of U.S. Provisional Application No.'s 60/136,405, and 60/136,406, both filed on May 27, 1999, the subject matter of both of which are herein expressly incorporated by reference in their entireties.

The present application relates to the subject matter described in a commonly-assigned, co-pending U.S. Patent Application (Attorney Docket No. P19004), entitled, "Method for Integrating User Models to Interface Design", filed May 26, 2000, to R. Bushey et al., and to the subject matter described in commonly-assigned, co-pending U.S. Patent Application (Attorney Docket No. P19115), entitled, "Method to Identify and Categorize Customer's Goals and Behaviors Within a Customer Service Center Environment", filed May 26, 2000, to R. Bushey et al., both of said applications being expressly incorporated by reference herein in their entireties.

The present invention relates to a method described in commonly-assigned co-pending U.S. Patent Application No. 09/089,403, "A Method for Categorizing, Describing, and Modeling Types of System Users", filed June 3, 1998, to R. Bushey et al. and to a method described in commonly-assigned co-pending U.S. Patent Application No. 09/303,622, "Methods for Intelligent Routing of Customer Requests Using Customer and Agent Models", filed May 3, 1999, to R. Bushey et al., the subject matter of both of which is expressly incorporated by reference herein in their entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to methods used in the business environment and application of human factors studies to the management of client/customer data. A first method relates to the field of user interface design and analysis of human factors which are considered pertinent during the development stages of the user interface. In particular, this invention considers human factors, through behavioral modeling methods, and then incorporates such factors into the iterative design stage of interface development. A second method relates to the identification and categorization

of customer's goals when contacting a customer service center; in particular, the field of integrating customer behavioral models with the handling of customer requests.

2. Description of Background Information

The traditional view of user performance during interface design and testing is that variability in responses, preferences, and behavior reflects poor design. The common knowledge and practice in the industry is to represent the user population as having a single set of characteristics and behaviors. In current practice, this single set of characteristics and behaviors focuses on only one of three types: expert, novice, or composite. One group is represented to the exclusion of other groups' needs. This is a particularly inappropriate method of designing in that there is a substantial risk that very few users will be best accommodated by the interface. Subsequently, an interface is designed in such a way that variability would be reduced. As a consequence, the diversity of the user population is neglected and users' unique needs and preferences are effectively ignored.

The common knowledge and practice in the industry is twofold. First, it is common practice to take a single view of a user population, and second, to subsequently design system interfaces based on this view. For example, a system interface may be designed to accommodate the behavior of an expert user (e.g., customer service and sales representatives). Alternatively, interfaces can be designed to accommodate a novice user (e.g., interfaces used in automated teller machines for use by the general public). Thus, the current practice represents the user population with a single set of characteristics and behaviors. If users or agents are categorized in any way, they are done so in an informal manner, based primarily on the opinion and judgement of local operating management and not based on formal qualitative and quantitative models, statistical data, or similar objective empirical measures.

Since it is common practice to take a singular view of the user population, the interface is designed and tested to reflect average or prototypical end user performance. For instance, during usability testing it is typical to deem a workflow task or design implementation a failure if 5 of 10 users successfully perform the task or function even though the interface was designed superbly for 5 of the users. Similarly, a design implementation is commonly deemed acceptable it 10 of 10 users performed adequately even though a closer examination may reveal that the majority of users reflected outstanding performance while the remaining subset could not display the required behavior. In both of these examples, the variability or diversity in performance is not considered during design or testing. Distinctive behaviors that may be

desirable are not tracked, captured, or accommodated since the emphasis has commonly focused on accommodating average behavior. The testing and design phase of interface development does not capitalize upon, or accommodate, variability in performance primarily because management and systems engineers typically accept the singular view of one user-representation.

Capturing the behavioral diversity of the user population is the first of two necessary steps toward the design and deployment of systems and processes that accommodate the specific needs of the user (agent) and facilitate business goals. The second necessary step is systematically integrating the agent models to the design and engineering of user interfaces.

Traditionally, the diversity of a user population has not been taken into account during the iterative design stage of interface development. Rather, a system is typically designed with the simplistic view of the "average" or prototypical user in mind. This approach does not accommodate the entire range of behaviors and characteristics of the user population. This single-view may hinder performance of a large proportion of users, given that their specific needs are not accommodated and management and systems interface engineers are unable to capitalize on the unique behavioral qualities that could facilitate performance and achieve business goals.

A solution to this approach is to consider the range of behavioral characteristics of the entire user population during the design phase of interface development. This broad range of behavior is ideally captured through use of behavioral models. Once the user population is categorized into a reasonable number of groups, the resultant qualitative and quantitative models can be integrated into system design and testing.

Prior art which discloses behavioral models are U.S. Patent Application No. 09/089,403, filed on June 3, 1998, entitled "A Method for Categorizing, Describing, and Modeling Types of Systems Users" and provisional U.S. Patent Application No. 60/097,174, filed on August 20, 1998, entitled "A Method for Intelligent Call Routing Utilizing a Performance Optimizing Calculation Integrating Customer and Agent Behavioral Models".

The Categorize Describe-Model (CDM) methodology, disclosed in U.S. Patent Application No. 09/089,403, is a technique used to categorize a diverse user population into a reasonable number of groups that share similar characteristics. The behaviors of users within these groups are then objectively described and subsequently quantitatively and qualitatively modeled. At any point in this process, the grouping characteristics may be validated and

revised based on the data collected and modifications of bottom-line business goals. The end result of the CDM method is that a highly diverse user population is divided into a small number of behaviorally distinctive groups (e.g., 3-5 user-groups). The members of each group share similar characteristics and behaviors. In effect, by using the CDM methodology, the entire range of behavioral diversity of a user population can be captured and accommodated.

Furthermore, the common knowledge and practice in the industry is to allow customers to map their goal to an organizational unit and, thus, determine which service center would best handle their goal. The customer typically does this with center information provided from the telephone directory or the bill. For example, some of the center information provided in the telephone directory include "to order or move your home telephone service", "for questions about your bill", and "residence repair". After the customer has contacted the center they believe is most appropriate to accomplish their goal, the customer typically has to use an IVR (Interactive Voice Response) system or a similar system to accomplish his/her intended goal. Based on the choice of the intended goal, a system is used to direct the customer to the appropriate center. The customer and the agent determine if the customer's goal can be appropriately handled at that center or if the customer needs to be transferred to another, more appropriate location.

Currently, customers use the telephone to present their goals. When the customer makes a call, some call centers may split off incoming customer calls to a dedicated agent group when the customer has a specific language preference. Some call centers also split off customer calls that originate from residences separate from customer calls that originate from businesses. In addition, some call centers split customer calls where the customer wishes to place an order for a service separate from the customer calls where the customer wishes additional information on their bill or similar information.

Whether a call center performs any preliminary routing or not, none of the call centers route customer calls to agents with a conditional probability. They also do not categorize the customers' behaviors and model those categorized behaviors. In addition, many service centers now handle customer requests through the telephone, while future technology will allow customers to accomplish their goals through a variety of channels beyond the telephone.

The ideal customer handling system is designed with full and complete knowledge of functionality, technology, and customer requirements. While functionality and technology issues are represented well, a full, rich understanding of the customers and their goal

statements are not well understood. In fact, the common assumption is that the customer's comments are similarly stated and, thus, a single view of the customer population can be taken. This single view approach limits the performance of an implemented customer service system because not all of the customer comments are similarly stated, and thus handled appropriately. Therefore, the implemented system may function well for certain customers, while being inappropriate for other customers. When overall performance is critical, these mishandled customer contacts can cost organizations time and money.

An improved approach to this situation is to not take a single view of the customers, but rather to examine the customers' comments and the verbal styles in which the comments are presented. The comments represent the goal of the customer and can be attained through a predicate analysis.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a flow diagram of the interface customization selections entered on a user-profile screen, according to an aspect of the present invention.

Figure 2 illustrates a flow diagram of the VaCTAC method of applying user models to interface design, according to an aspect of the present invention.

Figure 3 illustrates a flowchart of the Customer Goal and Behavior Categorization Method, according to an aspect of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

An objective of the disclosed invention is to establish a method that systematically and thoroughly applies user models derived through the CDM method to the design and testing phase of interface development. Rather than assuming a single set of behaviors or characteristics that represents the user population, the CDM method categorizes the user population into a small number of behaviorally distinctive groups. The present invention then extends this process and applies it directly to interface design.

This unique approach to usability testing and systems design ensures that the range of needs and preferences of the entire user population (e.g., each group derived through the CDM method) is considered. Customizing usability testing for each user group and allowing for flexibility in performance, not simply considering "average" behavior, allows for an improved understanding of the users and improved interface design leading to improved performance.

In contrast to the traditional approach, applying the CDM method to interface design involves accommodating variability in performance, and capitalizing on the diversity within

the user population. Application of the CDM method to design and testing involves tracking design requirements and implementations on micro and macro levels, documenting pre-determined user characteristics, capturing new user characteristics that emerge, accommodating diversity in performance and preference during testing, and customizing system display and navigation. This process ultimately facilitates the maintenance of user models to expedite future enhancements and business decisions.

The final objective and end-result is that customer/agent negotiations and call center operations are improved because the negotiation system interface is engineered to accommodate usability needs of the entire user population, targeted behaviors, and preferences that facilitate meeting business objectives.

According to an aspect of the present invention, a method for designing a customized user interface is provided that categorizes a user population into groups using qualitative and quantitative models, and applies the models into interface design, interactive testing, and system deployment. The step of categorizing a user population into groups using qualitative and quantitative models may be based upon Categorize-Describe-Model (CDM) methodology.

According to a further aspect of the present invention a method for designing a customized user interface is provided that includes categorizing at least two users, validating targeted user behaviors and preferences, capturing emergent behaviors and preferences, tracking design requirements and implementations, accommodating diversity in performance and preference during interactive testing, and customizing a user interface design to each of the at least two users.

Further aspects of the present invention include incorporating the user interface into the following hardware systems: a graphical user interface (GUI) of a sales and billing negotiation system; a telephone system, graphical user interface (GUI) provided on the Internet; a interactive graphic user interface (GUI) system; an automated teller machine; a computer operating system; or a television programming interface.

In another aspect of the present invention, a method for designing a customized user interface is presented that includes categorizing a user population into distinctive groups in which the users' behaviors are described, modeling the categorized user population using Categorize-Describe-Model (CDM) methodology, documenting and validating pre-determined user characteristics as indicated by initially grouping characteristics, including targeted behaviors and preferences, derived through said CDM methodology. The method also

includes capturing new user characteristics that emerge, simultaneously tracking design requirements and implementations on both micro and macro levels, accommodating variability and diversity in performance and preference during iterative testing by integrating user-customization into a design by creating a user-profile in which the users select various navigation preferences and information display choices that can be applied throughout the interface, and developing a customized user interface as an end-product.

One embodiment of how a user's interface may be modified based on user-group membership is illustrated in Figure 1. The initial step starts at a user-profile screen or multiple user-profile screens (2). A user profile screen is a segment of the interface where a user may configure or customize the interface to accommodate his/her needs.

Next, the CDM methodology would have pre-determined a user's behavioral characteristics and classified them into a specific user-group. In this example, the user would identify their group membership as the "blue" group (6) or "yellow" group (8). Ultimately, either the user or the system administrator would assign group membership at system log-on or registration.

Once the user identifies his/her group membership, the different functions (preference settings) within the interface are changed to accommodate the user-group's needs (10, 12). In this example, the user may also change his/her preference settings individually as well. Some examples of preference settings are: (1) short-cut keys - keys or macros that accelerate different functions; (2) pre-pop of account information - certain information that may be automatically presented on a screen at the users' discretion, such as account information; or (3) workflow maps - maps and help aids that indicate to the user what they should do during a negotiation. As an end result, the system interface would reflect functionality that is customized to the user's group membership (10, 12).

Figure 2 illustrates a preferred embodiment of how the CDM method is ideally applied to design and testing phases of interface development. As a preliminary step toward applying user models to design, the user population must be categorized into distinctive groups, their behaviors described, and subsequently modeled (14).

Once the CDM methodology is complete (14), the interface design process is implemented (16). The next series of boxes (shown in a clockwise arrangement; 16) depicts the application of the CDM method to interface design. Application of the CDM method to design and testing involves, first documenting and Validating pre-determined user

characteristics as indicated by the initial grouping characteristics derived through the CDM method (18). This would include targeted behaviors and preferences, and is a static process.

Second, Capturing new user characteristics that emerge is essential, given that new behaviors and characteristics are imminent with a new or enhanced system and must be quantified to enhance the initial grouping characteristics (20).

Third, design requirements and implementations must be Tracked (22) on both micro (within individual screens) and macro levels (how design alternatives fit within the user's work-flow). Tracking design implementations on micro levels refers to the detailed consideration of individual components of the interface (e.g., the placement and functionality of certain buttons on an individual graphical user interface (GUI) screen). Tracking design implementations on macro levels refers to the consideration of how all the interface components, being collectively the entire interface design, matches with the goals and the tasks of the user.

Fourth, Accommodating variability and diversity in performance and preference during iterative testing is paramount to taking the unique needs of the user population into consideration when developing final design requirements (24).

Finally, an extension of the process of accommodating variability and diversity is to integrate appropriate user-Customization in to the design (26). This would be accomplished through creating a user-profile in which the user would select various navigation preferences and information display choices that would be applied throughout the interface. Such alternatives and choices are determined based on behavioral characteristics of the user groups (derived via CDM phase) and business decisions from operations/management personnel.

The entire process of applying user models to interface design is referred to as the VaCTAC method (**V**alidate, **C**apture, **T**rack, **A**ccommodate and **C**ustomize). The end-product of this technique is a new interface (28) that: (a) has enhanced usability, (b) facilitates behaviors and preferences that are consistent to meeting business goals and operational decisions, (c) the broad range of usability needs of the entire population are addressed and capitalized upon by operations management, (d) results in revised, enhanced, and validated quantitative and qualitative user models, and (e) the design of future releases and enhancements would be expedited by the thorough knowledge of the user population gathered by this process.

To better understand the invention, it is important to describe in further detail how the CDM methodology may be applied to interface design. The first portion of data that contributes to this process is the "screenflow" analysis of the present invention. This analysis also helps to add detail to the qualitative user models and provides the level of detail necessary to create quantitative models of service representative behavior. The approach taken is to analyze specific call types based on the customer's initial request and how this request is ultimately resolved. These specific call types can then be analyzed to determine the prototypical navigation behavior used for that particular type of call.

A primary aspect of determining prototypical navigation behavior is to indicate the most common number, type, and sequence of interface screens visited during the particular customer/representative negotiation. A detailed description of this process and the results are provided below. The data used for this analysis was captured during side-by-side observations of service representatives.

In order to determine a prototypical screen-flow, it is necessary to identify call-types that are essentially identical to one another. For instance, all calls in which the customer requests "caller ID" to be added to their service, would be considered virtually identical to one another since the task of the service representative should be the same in all cases. To this end, the majority of calls observed were from two categories, namely, "order" and "information (info)" types of calls. The data captured that was used in identifying exactly what kind of calls fell within order and information given from the customer's opening statement (e.g., "I want to get a second telephone line for my computer modem") which was compared to the final resolution of the call (order, transfer, etc). It was determined that "information" types of calls included a wide variety of customer requests, so many in fact, that there was no single type of request that occurred frequently enough to warrant or allow subsequent analysis. However, there was sufficient consistency of customer requests under "order" call types to allow further analysis.

Therefore, all order type calls collected at call centers were categorized into sub-groups. A total of nine order call types were found, based on customers' opening statements and the observers' label of how the call was ultimately resolved. Four of the nine call types were subsequently analyzed, namely: new connects, moves, disconnect line, and caller ID. The problem and disconnect call types were not analyzed because further inspections of the screen flows indicated that these call types involved a wide range of navigation behavior that

varied on a call-to-call basis. Therefore, a prototypical screen flow could not be determined for these call types. Additional line (ADL), call blocker, and name change types were not included in subsequent analyses because there was not a sufficient number of these call from which to base meaningful conclusions. Although the number of caller ID calls was similarly low, it included the highest number of calls that a customer requested a specific product or service, and was subsequently included to minimally represent this type of customer/service representative negotiation.

For each call, it is necessary to determine the prototypical screen flow (baseline). In other words, it is necessary to identify the primary screens that service representatives visit and in what order these screens are visited. A baseline can be determined by visually inspecting a sample of individual records of screen flows for a given call type. For example, about 10-12 records can be inspected to determine a baseline screen flow. This visual inspection should be conducted to identify patterns of the same screens that are visited in the same sequence. The result is an initial baseline screen flow from which all records of the particular call type may be compared. In this way, it is possible to assess the common screen flow pattern associated with a given call type. Many of the representatives also visited other screens during negotiations, but these screens were not visited with any regularity among representatives. These "tangents" that a given representative would make during a negotiation within the screen flow were also analyzed, but results did not show any distinctive patterns. Each record of screen navigation also included behavioral data such as the sequential occurrence of cross-selling attempts and sequential occurrence of when a representative used a "help aid" (help aids include: a calculator, help screens, assistance from a manager, etc.).

The methodology of applying CDM to interface design would proceed in the following manner: during the requirements gathering phase of the interface design, documents are generated that captured roadblocks to usability within the present system and alternative design ideas to address these roadblocks. These "paste-ins" provide the starting point to implement CDM to design. Specifically, each design idea and/or requirement should be rated in terms of accommodating the quantitative models of the user population. Each design idea and/or requirement would consist of a description of functionality and checked whether or not it accommodates a given CDM user population grouping (blue, yellow, etc). This may be expanded to include a description of how a given group's characteristics have been accommodated, or how a given group's characteristics have not been addressed to serve as a

future aid to subsequent design enhancements. This could take the form of simply YES/NO binary coding, or as ratings based on subjective opinions of the designer(s) of the "level of accommodation". (1 - not accommodated; 7 - group's characteristics fully addressed). In addition, ratings should be made with reference to how an individual "fits" in with design requirement (micro implement) "fits"-in with the over-all workflow, and /or across screen navigation.

The advantages and benefits provided to the user of the present invention are numerous. Revenue generated per customer call should increase, since the sales/negotiation system is more customized to the individual user, reducing mental workload on the user and thus allowing for more emphasis on sales rather than navigation/system manipulation. Opposing behaviors are accounted for, which would increase the operational efficiency of the call center. For instance, the interface supports speed oriented behavior (high volume, short duration/low revenue calls) while simultaneously supporting service-oriented behavior (low volume, long duration/high revenue calls).

Also, a more customized system will maximize user-efficiency and thereby decrease unnecessary time-on-the-line and increase customer accessibility. Agents using this method could out-perform other similar agents at other organizations. Other organizations would still be attempting to meet the needs and preferences of their systems-users without a systematic method of accomplishing these requirements. Thus, the method of the present invention also represents an opportunity to distinguish the user of this method from all other carriers.

The user of this invention can benefit from strengthening its image with agents. It gives agents a reason to enhance their opinion of the user of the method of the present invention as a company that does adjust to employee's needs and capabilities. Thus, it is possible the user of this method may become the carrier of choice for the next generation and top performing agents. Finally, the method of the present invention allows agents to be compatible with Wireless, Long Distance, and other future services. The methodology of accommodating the range of behavioral diversity of systems users can be transferred and applied to different sales negotiation systems and interface development teams.

The present invention contributes to the identification and categorization of customer's goals, when contacting a customer service center. This invention also integrates customer behavioral models with the handling of customer requests. None of the prior art contains customer goal identification and customer behavioral models.

U.S. Patent Application No. 09/089,403, filed June 3, 1998, entitled "A Method for Categorizing, Describing, and Modeling Types of System Users" (referred to as "CDM") focuses on the categorization, describing and modeling of agents and customers. The method of the present invention incorporates some aspects of the CDM patent into the categorization of the customers. However, the present method also facilitates the determination of the customer's goal through predicate analyses and conditional probabilities.

The method of the present invention differs from provisional U.S. Patent Application No.60/097,174, filed on August 20, 1998 entitled "A Method for Intelligent Call Routing Utilizing A Performance Optimizing Calculation Integrating Customer and Agent Behavioral Models" in that the disclosed method is not a call routing method. The present method focuses on the reason a customer contacts a service center, i.e. their goal, and integrates this information into a complete view of the customer. The present method takes a broader view of customer channels by considering more than just the telephone.

A primary contribution of this invention is the conditional probability calculation to assign the appropriate goal category to the customer's request. No prior art contains a conditional probability calculation used to categorize the customer's request.

According to an aspect of the present invention, the method for identifying and categorizing customer goals for contacting a service center is provided which includes receiving a customer request; performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify one of a customer behavior and a goal for the customer; and assigning the customer request to a service center associated with the identified one of customer behavior and customer goal. The method includes categorizing the customer behavior into one of a plurality of groups, and matching a result of the verbal style analysis to an appropriate model with the categorized group.

According to another aspect of the present invention, the method may also include performing a predicate analysis which includes calculating conditional probabilities that relate the customer request to customer goal categories; comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value; and mapping the customer request to a customer goal category related to the maximum conditional probability if the maximum conditional probability is equal to or greater than the minimal set value.

In another aspect of the present invention, the predicate analysis of the method may include calculating conditional probabilities that relate the customer request to customer goal categories; comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value; asking a clarifying question if the maximum conditional probability is less than the maximum conditional probability; and subsequently performing the predicate analysis on the customer's request based on the answer to the clarifying question.

According to a further aspect of the present invention, the predicate analysis may include calculating conditional probabilities that relate the customer request to customer goal categories; comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value; and mapping the customer request to a customer goal category related to the maximum conditional probability if the maximum conditional probability is equal to or greater than the minimal set value.

In another aspect of the present invention, the predicate analysis may be performed by asking a clarifying question if the maximum conditional probability is less than the maximum conditional probability; and subsequently performing the predicate analysis on the customer's request based on the answer to the clarifying question.

According to a still further aspect of the present invention, a method is provided for identifying and categorizing customer goals for contacting a service center, wherein the method includes: receiving a customer request; performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify a customer behavior and a goal for the customer; categorizing the customer behavior into one of a plurality of behavioral groups; matching a result of the verbal style analysis to an appropriate behavioral group model; calculating conditional probabilities that relate the customer's request to respective customer goal categories; comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value; mapping the customer request to a customer goal category; and assigning the customer request to a service center associated with a respective one of the behavioral group model and the mapped customer goal category.

Further aspects of the invention include mapping the customer's goal to a respective goal category if the conditional probability for the customer's goal is equal to or greater than a minimal set value, and asking the customer a clarifying question if the conditional probability

for the customer's goal is equal to or greater than the minimum set value for goal categories related to more than one location.

According to other aspects of the present invention, if the conditional probability for the customer's goal is less than the minimum set value for the goal categories, a clarifying question is asked to the customer, and if a clarifying question is asked to the customer based on the customer's answer, a new predicate analysis is performed and new conditional probabilities for the customer's goal are calculated by comparing the maximum conditional probability against the minimum confidence goal value.

Further aspects of the present invention include expressing the receiving customer request through an interactive voice response system; expressing the receiving customer request through a question typed on a computer via an Internet connection; and expressing the receiving customer request through a question directly to a human operator via telephone.

According to another aspect of the present invention, the method may include performing verbal style analysis with respect to number of words used, types of words used, duration of comment, and method of contact. Also, the present invention includes performing predicate analysis on the customer's request to identify a customer behavior for the customer is based upon key words used by said customer, specific types of words the customer uses, and language components.

According to a further aspect of the present invention, the method may also include categorizing the customer behavior into one of a plurality of groups includes at least one of the groups comprising similar behaviors and at least one of the groups comprising different behaviors between the plurality of groups, and calculating conditional probabilities that relate the customer request to customer goal categories comprises a score that indicates how well said customer goal is matched to the respective goal category.

According to a still further aspect of the invention, a method is provided which includes: receiving a customer request; performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify one of a customer behavior and a goal for the customer; the performing verbal style analysis includes analysis with respect to number of words used, types of words used, duration of comment, and method of contact, and performing predicate analysis on the customer's request to identify a customer behavior for the customer is based upon key words used by the customer, specific types of words the customer uses, and language components.

The method may further include categorizing the customer behavior into one of a plurality of behavioral groups, wherein categorizing the customer behavior into one of a plurality of groups may include at least one of the groups having similar behaviors and at least one of said groups having different behaviors between the plurality of groups. Thereafter, a result of the verbal style analysis is matched to an appropriate behavioral group model, conditional probabilities that relate the customer's request to respective customer goal categories are calculated, and wherein the conditional probability is a score that indicates how well the customer goal is matched to respective said goal category.

The method may further include comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value and mapping the customer request to a customer goal category, wherein if the conditional probability for the customer's goal is equal to or greater than a minimal set value, the customer's goal is mapped to a respective the goal category. If the conditional probability for the customer's goal is equal to or greater than the minimum set value for goal categories related to more than one location, a clarifying question is asked to the customer, if the conditional probability for the customer's goal is less than the minimum set value for the goal categories, a clarifying question is asked to the customer, and if a clarifying question is asked to the customer based on the customer's answer, a new predicate analysis is performed and new conditional probabilities for the customer's goal are calculated by comparing the maximum conditional probability against the minimum confidence goal value, and the customer request is assigned to a service center associated with the mapped customer goal category.

According to another aspect of the present invention, a computer program is provided for identifying and categorizing customer goals for contacting a service center stored on a computer readable medium wherein the program may include codes for receiving a customer request, performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify one of a customer behavior and a goal for the customer, categorizing the customer behavior into one of a plurality of groups, and matching a result of the verbal style analysis to an appropriate model with the categorized group.

The program may further include calculating conditional probabilities that relate the customer request to customer goal categories, comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value. If the conditional probability for the customer's goal is equal to or greater than a minimal set value,

the customer's goal is mapped to a respective said goal category, if the conditional probability for the customer's goal is equal to or greater than the minimum set value for goal categories related to more than one location, a clarifying question is asked to the customer, if the conditional probability for the customer's goal is less than the minimum set value for the goal categories, a clarifying question is asked to the customer, and the customer request is assigned to a service center associated with the identified one of customer behavior and customer goal.

An objective of the present invention is to establish a method that identifies and categorizes a customer's goal and the customer's verbal style used to present that goal. The method then determines the conditional probability in which that particular goal matches a given goal category. Based on that conditional probability, the customers goal is then assigned to the appropriate goal category. If the conditional probability does not meet the minimum confidence goal value, a clarifying question is used to better determine the customer's goal. The conditional probability is then recalculated and compared to the minimum confidence goal value. The method also categorizes the customer into a behavior-based grouping, matches the customers' behavior to the appropriate customer model, and assigns that information to the same category determined from the conditional probability. The implemented customer goal and the behavior handling system will have a higher level of performance compared to systems that do not incorporate this method.

The present invention uses a predicate analysis on the customer comments. Based on the predicate analysis, conditional probabilities are determined for the customer comments as related to each of the possible goal categories. The goal category that results in the maximum conditional probability is then examined against the minimum confidence goal value. The minimum confidence goal value represents the lowest number in which the confidence of the goal category is at an acceptable level. If the maximum conditional probability is less than the minimum confidence goal value, a clarifying question is used to better determine the customer's goal. The conditional probabilities are recalculated and if the maximum conditional probability is greater than the minimum confidence goal value, the customer/comments are considered to be identified and, thus, can be handled appropriately and at the appropriate center. If the maximum conditional probability is less than the minimum confidence goal value, another clarifying question is used to better determine the customer's goal. If the maximum conditional probability is still less than the minimum confidence goal

value after a set of clarifying questions, the customer/comments are considered to be unknown and will be handled appropriately.

The customer comments also offer behavioral aspects of the customer through the verbal style used by the customer. For example, loquacious customers who describe a story rather than stating just the goal have a different behavior than customers whom clearly and succinctly state the goal. Thus, a verbal style analysis is used to facilitate the behavioral categorization of the customers. It could include analysis on the number of words used in the comments, the duration of the comments, key words used, etc. Additional analysis could also be examined, for example, the type of contact method used by the customer (i.e., talking on the telephone, typing on a computer and using the Internet, talking in person, etc.). These are important factors in determining how to behaviorally categorize the customer.

Figure 3 illustrates the customer behavior information and goal modeling method. The customer first expresses the goal (or problem) they are trying to achieve or complete, which is identified at S1 as a "customer request". The customer may express the goal through any appropriate medium, for example, an IVR system, a question on the Internet, directly to a human operator, or through some other channel or format.

Two types of analyses are then performed on the customer's comments, namely, verbal style analyses as indicated at S2 and predicate analyses as indicated at S3. The verbal style analyses would include, for example, the number of words used, types of words used, duration of comment, etc. In addition, these analyses would also include the method of contact (i.e., talking on the telephone, typing on a computer and using the Internet, talking in person, etc.).

After the verbal style analyses are performed, the customer's behavior is then categorized into one of a limited number of groups as indicated at S4. Next, the customer is matched to the appropriate behavioral model of the categorized group as indicated at S5. The customer's analyses and the corresponding model are then handled with the customer/comments to the final location as indicated at S6.

In the other flow shown in Figure 3, a predicate analysis is performed on the customer's comments as indicated at S3. This analysis would be based on a variety of analyses including, for example, the key words the customer uses, the specific types (e.g., verb, object, etc.) of words the customer uses, the language components, etc. The predicate analysis is expected to facilitate the determination of the customer's goal. The predicate analysis can also facilitate

the categorization of the customer into a behavioral group because the content of the customer comments may be specific to a particular group as indicated at S4.

Next, a conditional probability is determined for the customer goal as it relates to the goal categories as indicated at S7. The conditional probability is a score that indicates how well that particular customer goal is matched to a particular goal category. If the conditional probability for the customer's goal is equal to or greater than some minimal set value at S8, then the customer's goal is mapped to that goal category as indicated at S10. If the conditional probability for the customer's goal is equal to or greater than the minimum set value for goal categories related to more than one location at S8, a clarifying question is asked to the customer as indicated at S9. If the conditional probability for the customer's goal is less than the minimum set value for the goal categories, a clarifying question is asked to the customer.

If a clarifying question is asked to the customer at S9, based on the customer's answer, a new predicate analysis is performed at S3 and new conditional probabilities for the customer's goal are calculated. The maximum conditional probability will be examined against the minimum confidence goal value at S8.

After the customer's goal has been mapped to the appropriate goal category, the customer/comments are then handled at the location associated with the appropriate goal category.

Accordingly, the advantages of the present invention are primarily focused on improved operating performance. This means that the method of the present invention will allow the customer's goals to be better understood and, thus, a customer service center will be better able to accomplish those goals. This more efficient goal accomplishment benefits both the customer and the user of the present invention. Also, additional customer information and characteristics will be gained.

The current practice is to allow the customers to determine the best center to contact. This invention allows the customer to be handled based on the goals of the customer so that the match between customer goals and the center to accomplish those goals are optimized. The overall performance of the centers will improve with this goal identification method because each of the customer requests will be handled by the most appropriate center. Another advantage of the method of the present invention will be that the customers will have a higher level of satisfaction with the treatment and handling of their request because the agent/section will be better suited for their particular goal.

A summary of benefits to the user of the disclosed invention are listed below: (1) revenue generated per customer call should increase (fewer misdirects); (2) agents can out-perform other similar agents at other organizations; (3) other organizations would still be attempting to force all of their agents into determining the goals of the customer and then deciding if those goals could be appropriately handled in the location; (4) the present invention provides an important tool for obtaining and retaining customers; and (5) the present invention is a method which customers are expected to appreciate; it gives customers a reason to enhance their opinion of the user of the invention as a company that adjusts to their needs and capabilities; thus, the user of the invention becomes the carrier of choice.

Although the invention has been described with reference to several exemplary embodiments, it is understood that the words that have been used are words of description and illustration, rather than words of limitation.

The method disclosed can be used to design interfaces for a variety of systems, including but not limited to interactive telephone systems, interactive voice response systems, Internet based systems, interactive graphic user interface systems, automated teller machines, computer systems, television programming interfaces, and any other system which has an user interface.

The method disclosed can be used to identify and categorize the reason a customer contacts a customer service center on a variety of systems, including but not limited to interactive voice response systems, information input into a computer system via the Internet, computer systems, and any other system which a service center may use.

Changes may be made, without departing from the scope and spirit of the invention in its aspects. Although the invention has been described herein with reference to particular hardware, software, means, and embodiments, the invention is not intended to be limited to the particulars disclosed herein; rather, the invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.

WHAT IS CLAIMED:

1. A method for designing a customized user interface comprising:

categorizing a user population into groups using qualitative and quantitative models; and

applying said models into interface design, interactive testing, and system deployment.

2. The method according to claim 1, wherein the step of categorizing a user population into groups using qualitative and quantitative models is based upon Categorize-Describe-Model (CDM) methodology.

3. A method for designing a customized user interface comprising:

categorizing at least two users;

validating targeted user behaviors and preferences;

capturing emergent behaviors and preferences;

tracking design requirements and implementations;

accommodating diversity in performance and preference during interactive testing; and

customizing a user interface design to each of the at least two users.

4. The method according to claim 3, further comprising incorporating said user interface into a graphical user interface (GUI) of a sales and billing negotiation system.

5. The method according to claim 3, further comprising incorporating said user interface into a telephone system.

6. The method according to claim 3, further comprising incorporating said user interface based a on graphical user interface (GUI) provided on the Internet.

7. The method according to claim 3, further comprising incorporating said user interface into an interactive graphic user interface (GUI) system.

8. The method according to claim 3, further comprising incorporating said user interface into an automated teller machine.

9. The method according to claim 3, further comprising incorporating said user interface into a computer operating system.

10. The method according to claim 3, further comprising incorporating said user interface into a television programming interface.

11. A method for designing a customized user interface comprising:

categorizing a user population into distinctive groups in which said users' behaviors are described;

modeling said categorized user population using Categorize-Describe-Model (CDM) methodology;

documenting and validating pre-determined user characteristics as indicated by initially grouping characteristics, including targeted behaviors and preferences, derived through said CDM methodology;

capturing new user characteristics that emerge;

simultaneously tracking design requirements and implementations on both micro and macro levels;

accommodating variability and diversity in performance and preference during iterative testing by integrating user-customization into a design by creating a user-profile in which the users select various navigation preferences and information display choices that can be applied throughout the interface; and

wherein a customized user interface is developed as an end-product.

12. The method according to claim 11, further comprising incorporating said user interface into a graphical user interface (GUI) of a sales and billing negotiation system.

13. The method according to claim 11, further comprising incorporating said user interface into a telephone system.

14. The method according to claim 11, further comprising incorporating said user interface based a on graphical user interface (GUI) provided on the Internet.

15. The method according to claim 11, further comprising incorporating said user interface into an interactive graphic user interface (GUI) system.

16. The method according to claim 11, further comprising incorporating said user interface into an automated teller machine.

17. The method according to claim 11, further comprising incorporating said user interface into a computer operating system.

18. The method according to claim 11, further comprising incorporating said user interface into a television programming interface.

19. A method for identifying and categorizing customer goals for contacting a service center comprising:

receiving a customer request;

performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify one of a customer behavior and a goal for the customer; and

assigning the customer request to a service center associated with the identified one of customer behavior and customer goal.

20. The method according to claim 19, wherein said verbal style analysis comprises categorizing the customer behavior into one of a plurality of groups, and matching a result of the verbal style analysis to an appropriate model with the categorized group.

21. The method according to claim 19, wherein said predicate analysis comprises

calculating conditional probabilities that relate the customer request to customer goal categories;

comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value; and

mapping the customer request to a customer goal category related to the maximum conditional probability if the maximum conditional probability is equal to or greater than the minimal set value.

22. The method according to claim 19, wherein said predicate analysis comprises

calculating conditional probabilities that relate the customer request to customer goal categories;

comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value;

asking a clarifying question if the maximum conditional probability is less than the maximum conditional probability; and

subsequently performing the predicate analysis on the customer's request based on the answer to the clarifying question.

23. The method according to claim 20, wherein said predicate analysis comprises calculating conditional probabilities that relate the customer request to customer goal categories;

comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value; and

mapping the customer request to a customer goal category related to the maximum conditional probability if the maximum conditional probability is equal to or greater than the minimal set value.

24. The method according to claim 23, wherein said predicate analysis comprises asking a clarifying question if the maximum conditional probability is less than the maximum conditional probability; and

subsequently performing the predicate analysis on the customer's request based on the answer to the clarifying question.

25. A method for identifying and categorizing customer goals for contacting a service center, the method comprising:

receiving a customer request;

performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify a customer behavior and a goal for the customer;

categorizing the customer behavior into one of a plurality of behavioral groups;

matching a result of the verbal style analysis to an appropriate behavioral group model;

calculating conditional probabilities that relate the customer's request to respective customer goal categories;

comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value;

mapping the customer request to a customer goal category; and

assigning the customer request to a service center associated with a respective one of the behavioral group model and the mapped customer goal category.

26. The method according to claim 25, wherein if the conditional probability for the customer's goal is equal to or greater than a minimal set value, the customer's goal is mapped to a respective said goal category.

27. The method according to claim 25, wherein if the conditional probability for the customer's goal is equal to or greater than the minimum set value for goal categories related to more than one location, a clarifying question is asked to the customer.

28. The method according to claim 25, wherein if the conditional probability for the customer's goal is less than the minimum set value for the goal categories, a clarifying question is asked to the customer.

29. The method according to claim 25, wherein if a clarifying question is asked to said customer based on the customer's answer, a new predicate analysis is performed and new conditional probabilities for the customer's goal are calculated by comparing the maximum conditional probability against the minimum confidence goal value.

30. The method according claim 25, the method further comprising:

expressing the received customer request through an interactive voice response system.

31. The method according claim 25, the method further comprising:

expressing the received customer request through a question typed on a computer via an Internet connection.

32. The method according claim 25, the method further comprising:

expressing the received customer request is through a question directly to a human operator via telephone.

33. The method according claim 25, wherein performing verbal style analysis includes analysis with respect to number of words used, types of words used, duration of comment, and method of contact.

34. The method according claim 25, wherein performing predicate analysis on the customer's request to identify a customer behavior for the customer is based upon key words used by said customer, specific types of words said customer uses, and language components.

35. The method according claim 25, wherein categorizing the customer behavior into one of a plurality of groups includes at least one of said groups comprising similar behaviors and at least one of said groups comprising different behaviors between said plurality of groups.

36. The method according claim 25, the wherein calculating conditional probabilities that relate the customer request to customer goal categories comprises a score that indicates how well said customer goal is matched to said respective goal category.

37. A method for identifying and categorizing customer goals for contacting a service center, the method comprising:

receiving a customer request;

performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify one of a customer behavior and a goal for the customer;

said performing verbal style analysis includes analysis with respect to number of words used, types of words used, duration of comment, and method of contact; and

said performing predicate analysis on the customer's request to identify a customer behavior for the customer is based upon key words used by the customer, specific types of words the customer uses, and language components;

categorizing the customer behavior into one of a plurality of behavioral groups;

said categorizing the customer behavior into one of a plurality of groups includes at least one of said groups comprising similar behaviors and at least one of said groups comprising different behaviors between said plurality of groups;

matching a result of the verbal style analysis to an appropriate behavioral group model;

calculating conditional probabilities that relate the customer's request to respective customer goal categories;

wherein said conditional probability is a score that indicates how well said customer goal is matched to respective said goal category;

comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value;

mapping the customer request to a customer goal category;

wherein if the conditional probability for the customer's goal is equal to or greater than a minimal set value, the customer's goal is mapped to a respective said goal category;

wherein if the conditional probability for the customer's goal is equal to or greater than the minimum set value for goal categories related to more than one location, a clarifying question is asked to the customer;

wherein if the conditional probability for the customer's goal is less than the minimum set value for the goal categories, a clarifying question is asked to the customer;

wherein if a clarifying question is asked to the customer based on the customer's answer, a new predicate analysis is performed and new conditional probabilities for the customer's goal are calculated by comparing the maximum conditional probability against the minimum confidence goal value; and

assigning the customer request to a service center associated with the mapped customer goal category.

38. The method according claim 37, wherein the received customer request is expressed through an interactive voice response system.

39. The method according claim 37, wherein the received customer request is expressed through a question typed on a computer via an Internet connection.

40. The method according claim 37, wherein the received customer request is expressed through a question directly to a human operator via telephone.

41. A method for identifying and categorizing customer goals for contacting a service center comprising:

receiving a customer request;

performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify one of a customer behavior and a goal for the customer;

categorizing the customer behavior into one of a plurality of groups; and

matching a result of the verbal style analysis to an appropriate model with the categorized group;

calculating conditional probabilities that relate the customer request to customer goal categories;

comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value;

wherein if the conditional probability for the customer's goal is equal to or greater than a minimal set value, the customer's goal is mapped to a respective said goal category;

wherein if the conditional probability for the customer's goal is equal to or greater than the minimum set value for goal categories related to more than one location, a clarifying question is asked to the customer;

wherein if the conditional probability for the customer's goal is less than the minimum set value for the goal categories, a clarifying question is asked to the customer; and

assigning the customer request to a service center associated with the identified one of customer behavior and customer goal.

42. A computer program for identifying and categorizing customer goals for contacting a service center stored on a computer readable medium, comprising:

receiving a customer request;

performing at least one of a verbal style analysis and a predicate analysis on the customer's request to identify one of a customer behavior and a goal for the customer;

categorizing the customer behavior into one of a plurality of groups; and

matching a result of the verbal style analysis to an appropriate model with the categorized group;

calculating conditional probabilities that relate the customer request to customer goal categories;

comparing a maximum conditional probability obtained from the calculated conditional probabilities with a minimal set value;

wherein if the conditional probability for the customer's goal is equal to or greater than a minimal set value, the customer's goal is mapped to a respective said goal category;

wherein if the conditional probability for the customer's goal is equal to or greater than the minimum set value for goal categories related to more than one location, a clarifying question is asked to the customer;

wherein if the conditional probability for the customer's goal is less than the minimum set value for the goal categories, a clarifying question is asked to the customer; and

assigning the customer request to a service center associated with the identified one of customer behavior and customer goal.

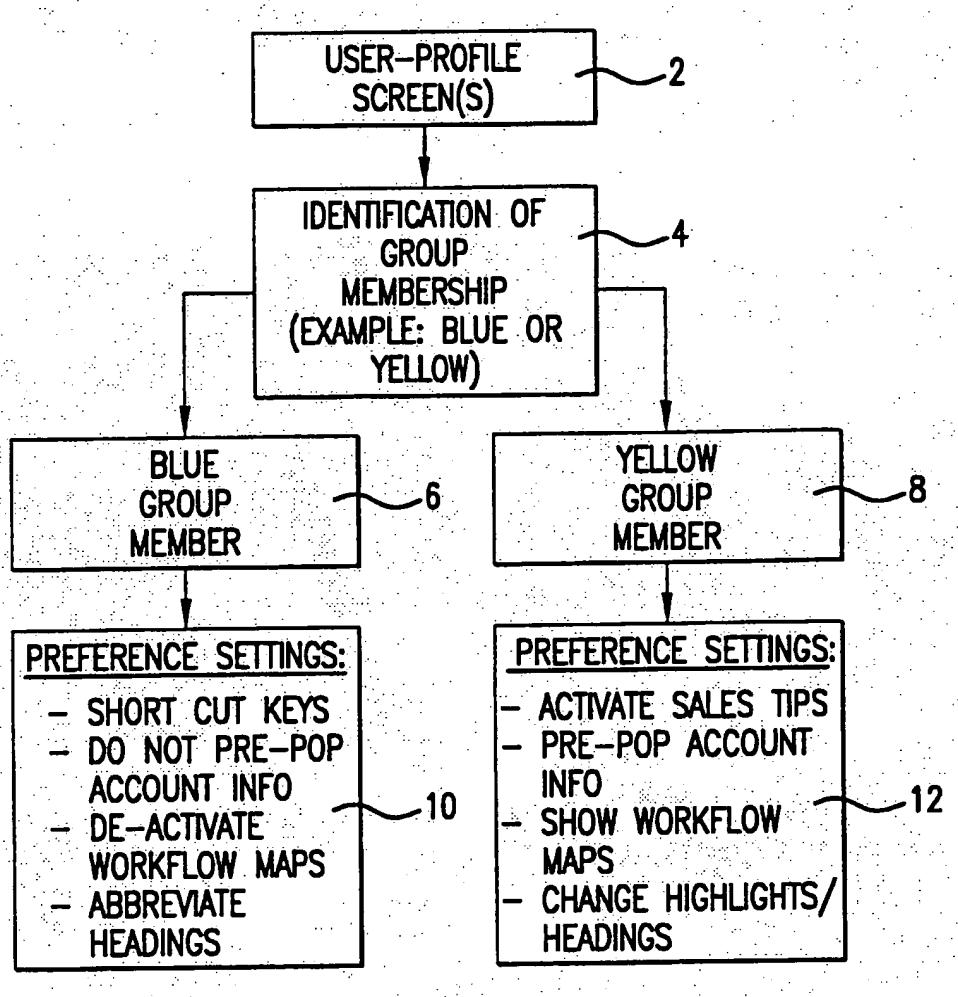
USER-PROFILE SCREEN(S)
2
IDENTIFICATION OF GROUP MEMBERSHIP (EXAMPLE: BLUE OR YELLOW)
4
BLUE GROUP MEMBER
6
YELLOW GROUP MEMBER
8
PREFERENCE SETTINGS:
- SHORT CUT KEYS
- DO NOT PRE-POP ACCOUNT INFO
- DE-ACTIVATE WORKFLOW MAPS
- ABBREVIATE HEADINGS
10
PREFERENCE SETTINGS:
- ACTIVATE SALES TIPS
- PRE-POP ACCOUNT INFO
- SHOW WORKFLOW MAPS
- CHANGE HIGHLIGHTS/ HEADINGS
12

FIG.1

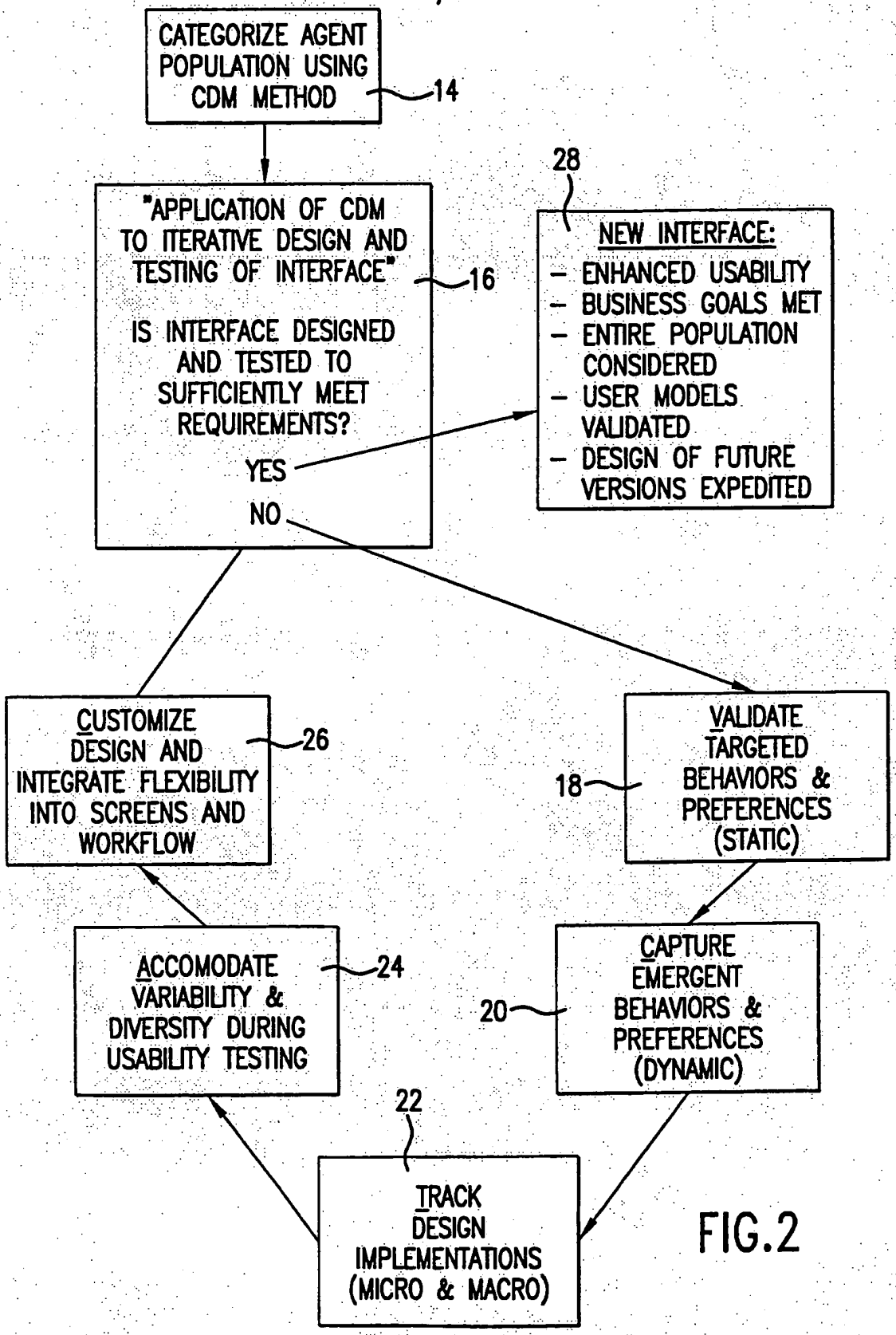
CATEGORIZE AGENT POPULATION USING CDM METHOD
14
"APPLICATION OF CDM TO ITERATIVE DESIGN AND TESTING OF INTERFACE"
16
IS INTERFACE DESIGNED AND TESTED TO SUFFICIENTLY MEET REQUIREMENTS?
YES
NO
28
NEW INTERFACE:
- ENHANCED USABILITY
- BUSINESS GOALS MET
- ENTIRE POPULATION CONSIDERED
- USER MODELS VALIDATED
- DESIGN OF FUTURE VERSIONS EXPEDITED
CUSTOMIZE DESIGN AND INTEGRATE FLEXIBILITY INTO SCREENS AND WORKFLOW
26
VALIDATE TARGETED BEHAVIORS & PREFERENCES (STATIC)
18
ACCOMODATE VARIABILITY & DIVERSITY DURING USABILITY TESTING
24
CAPTURE EMERGENT BEHAVIORS & PREFERENCES (DYNAMIC)
20
22
TRACK DESIGN IMPLEMENTATIONS (MICRO & MACRO)

FIG.2

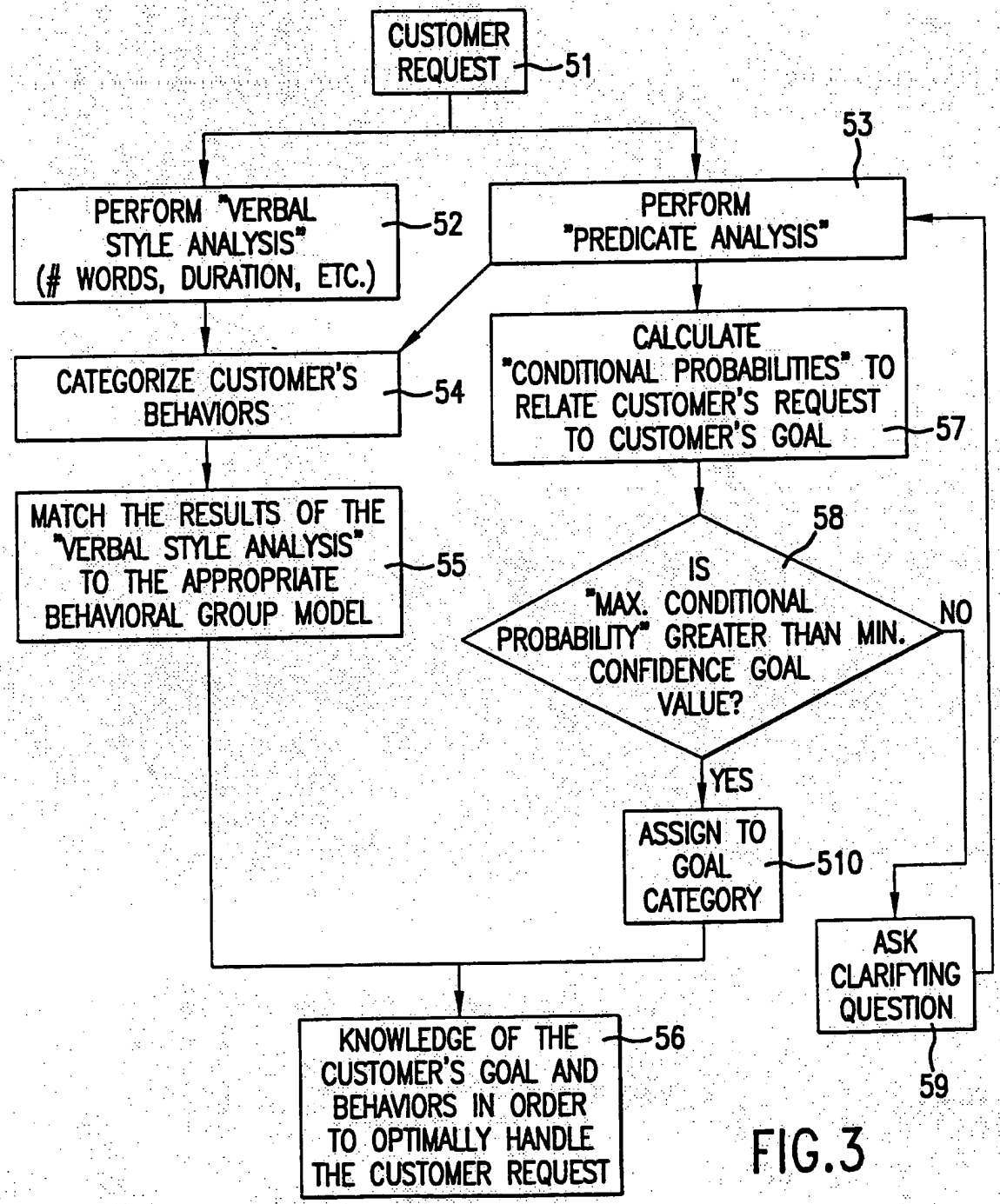
CUSTOMER REQUEST
51
53
PERFORM "VERBAL STYLE ANALYSIS" (# WORDS, DURATION, ETC.)
52
PERFORM "PREDICATE ANALYSIS"
CATEGORIZE CUSTOMER'S BEHAVIORS
54
CALCULATE "CONDITIONAL PROBABILITIES" TO RELATE CUSTOMER'S REQUEST TO CUSTOMER'S GOAL
57
MATCH THE RESULTS OF THE "VERBAL STYLE ANALYSIS" TO THE APPROPRIATE BEHAVIORAL GROUP MODEL
55
58
IS "MAX. CONDITIONAL PROBABILITY" GREATER THAN MIN. CONFIDENCE GOAL VALUE?
NO
YES
ASSIGN TO GOAL CATEGORY
510
ASK CLARIFYING QUESTION
59
KNOWLEDGE OF THE CUSTOMER'S GOAL AND BEHAVIORS IN ORDER TO OPTIMALLY HANDLE THE CUSTOMER REQUEST
56

FIG.3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/14468

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 19/00, 9/46
US CL :703/22, 27, 28; 706/50, 919; 709/220, 226

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 703/22, 27, 28; 706/50, 919; 709/220, 226

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Technical Journals, IEEE Transactions and Proceedings

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST/WEST searches, IEL online search

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,848,396 A (GERACE, THOMAS) 08 DECEMBER 1998, Abstract, cols. 2, 3, col. 4, lines 12-24, lines 37-47, col. 5, lines 27-31, col. 6, lines 22-39, cols. 7, 8, 13, 15.	1-42
Y	US 5,659,724 A (BORGIDA et al.) 19 August 1997, col. 2, line 55 to col. 3, line 52, cols. 5, 6, 8-10.	1-42
Y	US 5,884,029 A (BRUSH, II et al.) 16 March 1999, entire document.	1-42
Y	US 5,899,992 A (IYER et al.) 04 May 1999, entire document.	1-42

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

24 JULY 2000

Date of mailing of the international search report

29 AUG 2000

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Form PCT/ISA/210 (second sheet) (July 1998)*